1912 **RADIO (Ionospheric propagation)** **W H Eccles (UK)**

Following Marconi's success in 1901 in transmitting signals across the Atlantic, Kennelly and Heaviside postulated the existence of a conducting (ionized) layer in the earth's upper atmosphere and suggested that such a layer might cause the waves to follow the curvature of the earth. After it became clear that diffraction could not explain the substantial field strengths actually received at great distance, increased attention was directed to this proposal of an ionised region.

The theory of radio-wave propagation through the ionosphere is based on work by Eccles in 1912, on the ionizing effect of solar radiation, and on the effective refractive index of an ionized medium. Larmor in 1924 re-examined the work of Eccles and others and ascribed the major part of the refractive effect to the presence of free electrons in large numbers. The Eccles–Larmor theory, as later extended and developed by Appleton, Hartree and others to include the effect of anisotropy due to the earth's magnetic field, is now considered the basic theory of radio-wave propagation in the ionosphere. This work was later extended by Booker and others to cover oblique propagation in a nonhomogeneous ionosphere.

SOURCE: 'Radio-wave propagation between World Wars I and II' by S S Attwood *Proc. IRE* p 689 (May 1962)

SEE ALSO: 'On the diurnal variations of the electric waves occurring in nature and on the propagation of electric waves round the bend of the earth' by W H Eccles *Proc. R. Soc.* A vol 87, pp 79–99 (June 1912)